

Physicians' Use of Nonphysician Healthcare Providers for Colorectal Cancer Screening

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Background: Data on the involvement of nonphysician healthcare providers in colorectal cancer (CRC) screening delivery are sparse. This article describes physicians' use of nurse practitioners and physician assistants to provide CRC screening with the fecal occult blood test (FOBT), flexible sigmoidoscopy, and colonoscopy, as well as physicians' attitudes toward using these providers to perform flexible sigmoidoscopy.

Methods: Nationally representative samples of primary care physicians, gastroenterologists, and general surgeons were surveyed in 1999–2000. Descriptive statistics and logistic regression were used to estimate the prevalence and predictors of physicians' use of nurse practitioners and physician assistants for CRC screening and to assess physicians' attitudes toward their use in providing CRC screening with flexible sigmoidoscopy.

Results: Overall, 24% of primary care physicians reported using a nurse practitioner or physician assistant to provide CRC screening with FOBT. However, only 3% of all physicians surveyed used nurse practitioners and physician assistants for CRC screening with flexible sigmoidoscopy, and less than 1% of gastroenterologists and general surgeons reported using these providers to perform CRC screening with colonoscopy. Approximately 15% of general surgeons, 40% of primary care physicians, and 60% of gastroenterologists who do not currently use nurse practitioners or physician assistants to perform CRC screening with flexible sigmoidoscopy agreed that these providers could effectively perform the procedure.

Conclusions: These results show current involvement of nurse practitioners and physician assistants in the delivery of CRC screening to be limited. Use of nonphysician healthcare providers for CRC screening with FOBT and flexible sigmoidoscopy is one possible solution to the challenge of boosting low screening rates. However, physician beliefs about the ability of nurse practitioners and physician assistants to perform flexible sigmoidoscopy are a potential barrier to increasing the involvement of nonphysician providers in CRC screening delivery.

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Introduction

Current recommendations by the U.S. Preventive Services Task Force for colorectal cancer (CRC) screening state that all average-risk men and women aged 50 years and older should be screened for CRC with annual fecal occult blood testing (FOBT), flexible sigmoidoscopy every 5 years, annual FOBT plus flexible sigmoidoscopy every 5 years, double contrast barium enema every 5 years, or colonoscopy every 10 years.¹ Despite data on the effectiveness of CRC screening in reducing CRC mortality and recommendations for CRC screening by expert groups, screening rates for

CRC within the recommended time intervals remain below 30%.² There is concern that the low screening rates are due in part to insufficient numbers of physicians trained in colorectal endoscopy procedures to meet current and future demand for CRC screening in the United States.³ Given the aging of the population and the implementation in 1998 of Medicare coverage for CRC screening with four distinct screening modalities, concerns about the supply of physicians trained in colorectal endoscopy procedures, including flexible sigmoidoscopy, continue to intensify.

Although one way to enhance colorectal endoscopy capacity is to train more gastroenterologists, it does not appear that there is an intention to increase the number of gastroenterology training positions in the near future.⁴ It has been estimated that, based on flexible sigmoidoscopy performed every 5 years, ten million flexible sigmoidoscopy procedures—which is twice the number of flexible sigmoidoscopy procedures currently performed—would have been required in 2000 to

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achieve a rate of screening comparable to that of screening mammography.⁵ Furthermore, although the majority of flexible sigmoidoscopy procedures in the United States are conducted by primary care physicians, less than one third perform flexible sigmoidoscopy in their practices.⁶ It is likely that efforts to increase physician supply to perform these procedures would be difficult given current reimbursement levels and demands on physician practice time. One possible solution to address these capacity constraints is to involve nonphysician healthcare providers, such as well-trained nurse practitioners and physician assistants, in the provision of CRC screening.

Currently, some physician groups are using nonphysician healthcare providers to perform CRC screening.⁷⁻⁸ It has been shown that nurses can substantially increase FOBT screening rates when they are given responsibility for ordering this test in a busy clinical practice.⁹ Furthermore, studies assessing the delivery of CRC screening with flexible sigmoidoscopy by nurse practitioners and physician assistants have shown that, with adequate training, these providers are capable of performing the procedure safely and effectively.¹⁰⁻¹² To date, however, no study has quantified the extent to which nurse practitioners and physician assistants are engaged in delivering CRC screening nationally, and only one, using state-level data, has examined physician attitudes toward involving nurse practitioners and physician assistants in CRC screening.¹³

To gain a broader understanding of the current use of nurse practitioners and physician assistants in CRC screening and physician attitudes toward their use in performing flexible sigmoidoscopy on a national level, data from a unique nationally representative survey of U.S. physicians conducted in 1999–2000 were analyzed.

Methods

Survey Methodology

Data used in this paper were from the National Cancer Institute (NCI) Survey of Colorectal Cancer Screening Practices, which consisted of four nationally representative surveys of primary care physicians, gastroenterologists and general surgeons, diagnostic radiologists, and health plan medical directors. This effort was co-sponsored by the NCI, Centers for Disease Control and Prevention, and Centers for Medicare and Medicaid Services. For this report, items were taken from two surveys: one which asked primary care physicians whether they used a nurse practitioner, physician assistant, or both to provide CRC screening with FOBT, flexible sigmoidoscopy, or colonoscopy to patients in their practices; and one which asked gastroenterologist/general surgeons whether they used a nurse practitioner or physician assistant to provide CRC screening with flexible sigmoidoscopy or colonoscopy. Questions about use of nurse practitioners and physician assistants to perform these procedures were asked only of physicians who reported that they ordered (FOBT) or performed/supervised (sigmoidoscopy, colonoscopy) the

procedure at least once during a typical month. An item was also used that asked physicians to indicate, on a 4-point Likert scale (strongly agree, somewhat agree, somewhat disagree, or strongly disagree), whether they believed well-trained nurse practitioners and physician assistants can effectively perform CRC screening with flexible sigmoidoscopy.

The survey samples of 1630 primary care physicians, 467 gastroenterologists, and 467 general surgeons were obtained from the American Medical Association's Physician Masterfile. A systematic random sample for each specialty was selected using a fractional sampling interval after sorting the file by U.S. census region, urban/rural location, and physician gender. Gastroenterologists were over-sampled. Eligible respondents were aged 75 years and younger and listed in the database as having an active license to practice medicine and patient care as their major professional activity. Obstetrician/gynecologists were included in the primary care physician sample because of their role as providers of preventive services for many women in the United States.¹⁴ Sampled physicians were sent an advance mailing in the Fall of 1999 that contained a cover letter describing the objectives of the survey, letters of support from five medical societies and the U.S. Surgeon General, and a postcard with a stamped return envelope; physicians were asked to verify their specialty and status as a practicing physician and to indicate their preferred mode of response to the survey (mail, fax, telephone, or Internet). Physicians who responded to the advance mailing were sent a subsequent mailing that included the mail or fax version of the questionnaire appropriate to their specialty or instructions on how to complete the survey by telephone or Internet, depending on their stated preference. Approximately 6 weeks later, nonresponding physicians were sent a follow-up mailing that contained the mail version of the questionnaire. A second follow-up mailing of the questionnaire was sent by express mail to eligible nonrespondents in February 2000. Telephone follow-up of nonrespondents was undertaken in March and early April 2000. All respondents received a prepaid \$50 honorarium check. More details on the design, administration, and content of the NCI Survey of Colorectal Cancer Screening Practices are available at <http://healthservices.cancer.gov/surveys/colorectal>.

Statistical Analysis

Descriptive statistics were used to estimate physicians' use of nurse practitioners and physician assistants to conduct CRC screening with FOBT, flexible sigmoidoscopy, and colonoscopy, as well as to assess physicians' attitudes toward using these providers to provide CRC screening with flexible sigmoidoscopy. Bivariate and multivariate logistic regression analyses were used to examine factors associated with primary care physicians' use of nurse practitioners and physician assistants for CRC screening with FOBT and with primary care physicians', gastroenterologists', and general surgeons' agreement that well-trained nurse practitioners and physician assistants can effectively perform CRC screening with flexible sigmoidoscopy. Factors examined included characteristics of the physician (age, gender, race, specialty, whether has a medical school affiliation or is a full or part owner of a medical practice, monthly volume of FOBT ordered or performed); practice setting (urban versus rural location, Census region in which located, number of physicians in practice setting); and patients seen (number seen during a typical

Table 1. Characteristics of primary care^a and nonprimary care^b physicians and their practice settings, Survey of Colorectal Cancer Screening Practices, 1999–2000

Characteristics	Primary care physicians		Nonprimary care physicians	
	<i>n</i>	%	<i>n</i>	%
Total N	1235		665	
Gender				
Male	957	77.5	618	92.9
Female	278	22.5	47	7.1
Age (years)				
<40	274	22.2	111	16.7
40–49	483	39.1	254	38.2
50–59	304	24.6	210	31.6
≥60	174	14.1	90	13.5
Race				
White (non-Hispanic origin)	894	73.2	482	73.8
Nonwhite ³	330	26.8	170	26.6
Specialty				
Family practice	423	34.3		
Obstetrics/gynecology	224	18.1		
General practice	100	8.1		
Internal medicine	488	39.5		
Gastroenterology			349	52.5
General surgery			316	47.5
Medical school affiliation				
Yes	467	37.8	272	40.9
No	752	60.8	356	55.9
SMSA (urban) location				
Yes	750	60.7	433	65.1
No	485	39.4	232	34.9
U.S. census region				
Northeast	259	21.0	163	24.5
North Central	303	24.5	145	21.8
South	401	32.5	226	34.0
West	272	22.0	131	19.7
Practice type				
Solo	306	25.4	192	30.5
Single-specialty group	497	41.2	261	41.4
Multi-specialty group	403	33.4	177	28.1
Number of physicians in practice setting				
≤5	749	61.8	413	65.7
6–15	209	17.2	112	17.8
16–49	117	9.6	28	4.4
50–99	62	5.1	26	4.1
≥100	76	6.3	50	8.0
Full or part owner of physician practice				
Yes	614	49.7	498	74.9
No	612	49.7	160	23.1
> 50% of patients are covered by managed care				
Yes	534	44.2	257	41.0
No	675	54.7	369	55.0
> 75 patients seen in a typical week				
Yes	869	71.2	189	28.8
No	351	28.5	467	72.8

^aPrimary care physicians include family and general practitioners, general internists, and obstetrician/gynecologists.

^bNonprimary care physicians include gastroenterologists and general surgeons.

^cThe nonwhite category includes 12.1% Asian/Pacific Islander, 6.0% Hispanic, 2.8% black, and 5.8% other/unknown primary care physicians; and 13.0% Asian/Pacific Islander, 4.2% Hispanic, 1.8% black, and 7.7% other/unknown nonprimary care physicians.

SMSA, Standard Metropolitan Statistical Area

week, proportion covered by managed care, estimated proportion up to date with CRC screening as recommended by the physician). For each dependent variable of interest (primary care physicians' use of nurse practitioners and physician assistants for screening with FOBT and primary care physicians', gastroenterologists', and general surgeons' stated agreement that well-trained nurse practitioners and physician assistants can effectively perform flexible sigmoidoscopy), a full model was fit.

For the practice and patient characteristics components of the models, individual variables were removed from final models if they did not significantly contribute to model fit by the likelihood ratio test at $p < 0.05$. SUDAAN (Research Triangle Institute, Research Triangle Park NC, 1997), a statistical program designed for analysis of complex survey samples, was used to estimate the logistic regression model predicting gastroenterologists' and general surgeons' attitudes towards using well-trained nurse practitioners and physician assistants for flexible sigmoidoscopy. All analyses were based on weighted survey data. The weights are based on the probability of selection into the sample and adjust survey results for known sources of respondent bias.

Results

Description of Respondents

A total of 1235 primary care physicians (overall response rate=72%) and 665 gastroenterologists and general surgeons (overall response rate=83%) responded to the survey. Characteristics of physicians and their practice settings are displayed in Table 1. Nonprimary care physicians were more likely than primary care physicians to be older, male, in solo practice, and to have an ownership interest in their primary practice settings. Primary care physicians were more likely to practice in a multispecialty group and see more patients per week than nonprimary care physicians.

Physicians' Use of Nurse Practitioners and Physician Assistants for FOBT, Sigmoidoscopy, and Colonoscopy

Overall, 24% of primary care physicians reported using a nurse practitioner or physician assistant to provide CRC screening with FOBT for asymptomatic, average-risk patients (Table 2). Seventy-five percent of these physicians indicated that they supervise a nurse practitioner who orders or performs FOBT, while 25% reported supervising a physician assistant who does this.

Among the 29% of primary care physicians, 92% of gastroenterologists, and 59% of general surgeons who reported that they conduct CRC screening with flexible sigmoidoscopy, approximately 3% indicated that they supervise a nurse practitioner or physician assistant who performs the procedure. Use of nurse practitioners and physician assistants to provide flexible sigmoidoscopy varied by specialty, ranging from 7.1% of general internists to 3.1% of gastro-

Table 2. Estimates of and factors associated with primary care physicians' use of nurse practitioners and physician assistants for colorectal cancer screening with FOBT

Factor	Use nurse practitioners and/or physician assistants for FOBT <i>n</i> =1121 % (95% CI)	Predictors of using nurse practitioners or physician assistants for FOBT	
		Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Total	23.8 (21.3–26.3)		
Gender of physician			
Male	23.3 (20.5–26.2)	0.89 (0.64–1.23)	1.14 (0.78–1.68)
Female	25.4 (20.0–30.8)	1.0	1.0
Age of physician (years)			
<40	25.5 (20.1–30.9)	1.15 (0.83–1.60)	1.60 (0.88–2.90)
40–49	26.3 (22.2–30.4)	1.25 (0.95–1.65)	1.50 (0.87–2.57)
50–59	22.6 (17.6–27.6)	0.92 (0.66–1.27)	1.63 (0.93–2.88)
≥60	16.1 (10.3–22.0)	1.0	1.0
Race of physician			
White, non-Hispanic	26.4 (23.4–29.4)	1.78 (1.27–2.52)	1.51 (1.02–2.22)
Nonwhite	16.0 (11.9–20.2)	1.0	1.0
Specialty of physician			
Family practice	33.8 (29.1–38.4)	2.24 (1.69–2.96)	1.73 (0.85–3.54)
Internal medicine	17.4 (13.8–20.9)	0.54 (0.40–0.72)	0.70 (0.33–1.47)
Obstetrics/gynecology	21.9 (16.1–27.8)	0.87 (0.60–1.27)	0.77 (0.35–1.72)
General practice	15.9 (8.1–23.7)	1.0	1.0
Region of practice			
Northeast	22.5 (17.2–27.8)	0.92 (0.65–1.29)	0.89 (0.58–1.37)
North Central	22.7 (17.6–27.7)	0.93 (0.67–1.28)	0.86 (0.57–1.31)
West	26.6 (21.0–32.2)	1.19 (0.86–1.65)	1.11 (0.72–1.70)
South	23.6 (19.3–28.0)	1.0	1.0
Practice type			
Single-specialty group	28.6 (24.5–32.7)	1.57 (1.19–2.07)	1.67 (1.07–2.62)
Multi-specialty group	23.5 (19.2–27.8)	0.96 (0.72–1.29)	1.31 (0.80–2.16)
Solo	15.6 (11.2–20.0)	1.0	1.0
Full- or part-time owner of physician practice			
Yes	21.7 (18.3–25.2)	0.81 (0.61–1.08)	0.88 (0.62–1.24)
No	25.4 (21.8–29.0)	1.0	1.0
> 50% of patients covered by managed care			
Yes	25.4 (21.6–29.3)	1.17 (0.89–1.55)	1.21 (0.88–1.67)
No	22.2 (19.0–25.5)	1.0	1.0
<25% of patients aged >50 years are up to date with colorectal cancer screening^a			
Yes	21.5 (14.8–28.1)	0.86 (0.56–1.31)	0.85 (0.53–1.35)
No	24.2 (21.4–27.1)	1.0	1.0
Number of FOBT ordered/performed per month			
>40	26.7 (21.2–32.3)	1.23 (0.89–1.70)	1.96 (1.16–3.30)
21–40	24.6 (19.6–29.7)	1.05 (0.77–1.43)	1.62 (0.98–2.67)
11–20	26.8 (22.0–31.6)	1.26 (0.94–1.69)	1.50 (0.93–2.44)
1–10	16.3 (11.7–20.8)	1.0	1.0

Data source: Survey of Colorectal Cancer Screening Practices, 1999–2000.

^aPhysician-reported estimate of the proportion of patients aged ≥50 years in practice who are up to date with colorectal cancer screening, as recommended by the physician.

CI, confidence interval; FOBT, fecal occult blood test; OR, odds ratio.

enterologists, 1.4% of general surgeons, 1.3% of family practitioners, 1.1% of general practitioners, and 0% of obstetrician/gynecologists (data not shown).

Of the 92% of gastroenterologists and 50% of general surgeons who conduct CRC screening with colonoscopy, less than 1% reported that they supervise a nurse practitioner or physician assistant who performs the procedure (data not shown).

Factors Associated with Primary Care Physicians' Use of Nurse Practitioners and Physician Assistants for FOBT

Table 2 shows the factors associated with primary care physicians' use of nurse practitioners and physician assistants for CRC screening with FOBT. Primary care physicians who were white, practiced in a single-specialty group, or who ordered or performed more than

40 FOBT per month were significantly more likely to report using a nurse practitioner or physician assistant to order or perform CRC screening with FOBT.

Physicians' Attitudes Toward Using Nurse Practitioners and Physician Assistants to Provide Flexible Sigmoidoscopy

Approximately 15% of general surgeons, 40% of primary care physicians, and 60% of gastroenterologists who do not currently use nurse practitioners or physician assistants to perform CRC screening with flexible sigmoidoscopy agreed with the statement that these providers, if well trained, could effectively perform the procedure (Table 3). Among primary care physicians, those who were aged 40–59 years were significantly more likely to agree that nurse practitioners and physician assistants can effectively perform flexible sigmoidoscopy compared to older physicians. Also, primary care physicians who were white, family practitioners, practiced in the western U.S. census region, or belonged to either a single- or multi-specialty group practice were significantly more likely to agree that well-trained nurse practitioners and physician assistants can effectively perform flexible sigmoidoscopy. In contrast, among gastroenterologists and general surgeons, only specialty type was a predictor of physician attitudes, with gastroenterologists significantly more likely than general surgeons to agree that well-trained nurse practitioners and physician assistants can effectively perform flexible sigmoidoscopy.

Discussion

This is the first national study to report on physicians' use of nurse practitioners and physician assistants for CRC screening as well as physicians' attitudes towards using these nonphysician providers for CRC screening with flexible sigmoidoscopy. As shown, although about one quarter of primary care physicians are using nurse practitioners and physician assistants for CRC screening with FOBT, use of these nonphysician providers by primary care physicians, gastroenterologists, and general surgeons to perform CRC screening with flexible sigmoidoscopy and colonoscopy is minimal.

The finding that primary care physicians who reported a high volume of FOBT are more likely to use a nurse practitioner or physician assistant to order or perform this test parallels prior work, including a study conducted in the Veterans Administration medical system that demonstrated use of nursing staff to order FOBT in a general internal medicine clinic significantly increased the number of FOBTs ordered compared to similar clinics that only used physicians to order this test.⁹

The finding that only 3% of primary care physicians, gastroenterologists, and general surgeons use nurse practitioners and physician assistants for CRC screening with flexible sigmoidoscopy is surprising, although it is consistent with data from an earlier state-level survey of nurse practitioners and physician assistants.¹³ Nurse practitioners and physician assistants have been performing sigmoidoscopic examinations since the early 1970s and have been shown to be willing and able to perform the procedure.^{15–16} In addition, many states have approved the use of flexible sigmoidoscopy by nurse practitioners. A 1999 survey of state boards of nursing and U.S. gastroenterology fellowship programs showed that 50% (25 of 50) of state boards explicitly approve the use of flexible sigmoidoscopy by nurse practitioners for CRC screening; 23 of the remaining 25 states have no written policy but permit nurse practitioners to perform flexible sigmoidoscopy.¹⁷

The nominal involvement of nurse practitioners and physician assistants in providing CRC screening with flexible sigmoidoscopy may be in part due to limited training opportunities. Among nationally accredited programs, no nurse practitioner and few physician assistant programs offer training in flexible sigmoidoscopy. Of those that do, the minimum standard of greater than 25 supervised procedures mandated for physicians by the American Society for Gastrointestinal Endoscopy is not required.^{17–18} A recent survey of nurse practitioner and physician assistant education programs showed that, among 118 certified physician assistant programs, 13% offer flexible sigmoidoscopy training, with a median minimum number of supervised procedures of 15.¹⁹ These results are in contrast to the 24 U.S. gastroenterology fellowship programs that offer training for nurse practitioners and physician assistants, 16 of which require these providers to perform far more than the standard of greater than 25 procedures. Despite the limited and variable training opportunities in flexible sigmoidoscopy for nurse practitioners and physician assistants, several studies have found few or no differences in the ability of these providers to perform flexible sigmoidoscopies safely and effectively compared to gastroenterologists and general surgeons.^{10–12} The nurse practitioners and physician assistants participating in these studies received hands-on training at their work sites, with gastroenterologists serving as preceptors.

A major goal of *Health People 2010*²⁰ is to increase CRC screening rates for average-risk men and women aged 50 years and older. Nationally, approximately 29% of those eligible for average-risk screening reported being tested with FOBT in the past 2 years and only 20% reported being screened with endoscopy in the past 3 years.² Unlike the number of new physicians entering practice, which only grew 27% from 1992 to 2000, the number of certified and practicing nurse

Table 3. Factors associated with physicians' stated agreement that well-trained nurse practitioners and physician assistants can effectively perform colorectal cancer screening with flexible sigmoidoscopy

Factor	Primary care physicians ^a n=1211 ^c		Nonprimary care physicians ^b n=574 ^c	
	% (95% CI)	OR ^d (95% CI)	% (95% CI)	OR ^d (95% CI)
Total^e	40.2 (37.4–43.0)		30.0 (26.5–33.6)	
Gender of physician				
Male	41.4 (38.3–44.6)	1.27 (0.90–1.79)	30.3 (26.6–34.1)	1.71 (0.77–3.82)
Female	36.0 (30.3–41.7)	1.0	25.7 (12.4–39.0)	1.0
Age of physician (years)				
<40	38.9 (33.0–44.7)	1.36 (0.83–2.26)	34.7 (24.9–44.4)	0.89 (0.36–2.19)
40–49	42.7 (38.3–47.2)	1.80 (1.14–2.83)	36.4 (30.1–42.7)	1.19 (0.55–2.58)
50–59	44.3 (38.6–50.0)	2.34 (1.45–3.76)	25.6 (19.5–31.8)	0.83 (0.38–1.82)
≥60	28.0 (21.1–34.8)	1.0	21.6 (11.6–31.5)	1.0
Race of physician				
White, non-Hispanic	42.6 (39.3–45.9)	1.39 (1.01–1.91)	32.8 (28.3–37.4)	1.64 (0.95–2.83)
Nonwhite	33.6 (28.4–38.7)	1.0	22.4 (16.2–28.6)	1.0
Specialty of physician				
Family practice	47.8 (43.0–52.7)	1.96 (1.06–3.59)		
Internal medicine	44.0 (39.6–48.6)	1.79 (0.97–3.30)		
Obstetrics/gynecology	23.2 (17.6–28.8)	0.72 (0.36–1.42)		
General practice	28.3 (19.2–37.3)	1.0		
Gastroenterology			57.7 (52.3–63.0)	7.11 (4.09–12.35)
General surgery			15.2 (10.7–19.7)	1.0
Region of practice				
Northeast	40.9 (34.9–47.0)	1.18 (0.81–1.71)	33.8 (25.7–41.8)	1.03 (0.56–1.90)
North Central	37.9 (32.4–43.4)	0.90 (0.63–1.29)	19.8 (13.7–26.0)	0.65 (0.37–1.16)
West	49.6 (43.6–55.6)	1.86 (1.28–2.70)	38.1 (28.6–47.6)	1.86 (0.98–3.52)
South	35.1 (30.3–39.8)	1.0	30.6 (24.0–37.2)	1.0
> 50% of patients covered by managed care				
Yes	40.6 (36.4–44.8)	1.17 (0.89–1.54)	32.8 (26.4–39.3)	0.99 (0.62–1.58)
No	39.7 (36.0–43.4)	1.0	29.6 (24.9–34.3)	1.0
<25% of patients are up to date on colorectal cancer screening^f				
Yes	34.8 (27.3–42.2)	0.87 (0.59–1.29)		
No	41.5 (38.3–44.6)	1.0		
Full or part owner of practice				
Yes	36.9 (33.1–40.8)	0.84 (0.62–1.14)	27.6 (23.5–31.6)	0.61 (0.34–1.08)
No	43.8 (39.8–47.7)	1.0	39.9 (31.3–48.5)	1.0
Practice type				
Single-specialty	40.7 (36.3–45.1)	1.51 (1.03–2.19)	33.6 (27.6–39.6)	0.88 (0.49–1.60)
Multi-specialty	48.8 (43.9–53.8)	1.89 (1.25–2.84)	38.2 (30.2–46.2)	1.09 (0.55–2.17)
Solo	28.9 (23.7–34.0)	1.0	23.3 (16.8–29.7)	1.0
Number of flexible sigmoidoscopies performed/supervised per month				
1–5	51.3 (44.2–58.3)	1.44 (1.00–2.09)	19.4 (12.9–25.8)	0.92 (0.43–1.94)
6–10	51.7 (41.2–62.1)	1.34 (0.82–2.19)	40.2 (30.7–49.7)	1.57 (0.69–3.54)
11–20	41.7 (24.7–58.6)	0.73 (0.34–1.57)	52.1 (41.1–63.1)	1.06 (0.44–2.54)
> 20	35.7 (7.0–64.4)	0.76 (0.20–2.93)	51.6 (41.9–61.4)	0.90 (0.39–2.09)
0	36.3 (33.0–39.5)	1.0	18.4 (10.8–26.0)	1.0

Data source: Survey of Colorectal Cancer Screening Practices, 1999–2000.

^aPrimary care physicians include family and general practitioners, general internists, and obstetrician/gynecologists.

^bNonprimary care physicians include gastroenterologists and general surgeons.

^cAmong physicians who did not report using a nurse practitioner or physician assistant for colorectal cancer screening with sigmoidoscopy.

^dOdds Ratios (OR) are adjusted for other covariates in the model.

^e11.3% of primary care and 8.3% of nonprimary care physicians agreed strongly; 28.9% of primary care and 21.7% of nonprimary care physicians agreed somewhat.

^fPhysician-reported estimate of the proportion of patients aged 50 and over in practice, who are up to date with colorectal cancer screening as recommended by the physician.

practitioners and physician assistants doubled during this same time period.²¹ In 2001, there were approximately 57,000 certified and practicing physician assistants and 70,000 certified and practicing nurse practitioners.^{21–22} About 90% of nurse practitioners and physician assistants provide primary care services and approximately 60% practice in an office setting.²¹

Although few primary care physicians, gastroenterologists, and general surgeons reported using nurse practitioners or physician assistants to provide CRC screening with flexible sigmoidoscopy, 40% of primary care physicians and approximately 60% of gastroenterologists who took part in this survey agreed that well-trained nurse practitioners and physician assistants

could effectively perform the procedure. These attitudes suggest that many physicians, particularly gastroenterologists, might be receptive to providing hands-on training in flexible sigmoidoscopy for nurse practitioners and physician assistants. This receptivity could extend to inclusion of nurse practitioners and physician assistants in the team of providers who deliver screening endoscopy, particularly in busy gastroenterology practices, thereby fostering increased procedure volume and a more efficient use of personnel (i.e., the nurse practitioner or physician assistant responsible for routine screening procedures and the gastroenterologist focusing on the more involved colonoscopy and diagnostic procedures). The Kaiser Permanente CoCAP CRC screening program is one example of the effectiveness of this approach.⁷

Data on the role of nonphysician healthcare providers in CRC screening are quite sparse. Strengths of this study included large sample sizes, high response rates, and nationally representative samples. An important limitation was that the authors did not ascertain the extent of physicians' access to nurse practitioners and physician assistants. However, recent data from the National Ambulatory Medicare Care Survey show that, during the latter half of the 1990s, 25% of primary care physicians reported using a nurse practitioner or physician assistant.²³ Although comparable national data for gastroenterologists are not available, a recent poll of 70 U.S. gastroenterology practices participating in an endoscopy research consortium found that 20% have nurse practitioners or physician assistants on staff (personal communication, P. DeGarmo, Oregon Health & Science University, October 23, 2002).

These results are the first to provide a national picture of physicians' use of nurse practitioners and physician assistants for CRC screening and attitudes among physicians towards the use of these nonphysician providers in performing flexible sigmoidoscopy. An increasing number of nurse practitioners and physician assistants are entering the healthcare field, and their roles in primary care and prevention are becoming more extensive. An integrated care approach in which nonphysician healthcare providers are involved in the delivery of CRC screening with FOBT and flexible sigmoidoscopy is one possible solution to the challenges of boosting low screening rates.

This study shows current involvement of nurse practitioners and physician assistants in CRC screening delivery to be limited. Future research and policies should focus on specific strategies for overcoming barriers to delivery of CRC screening by nurse practitioners and physician assistants, including negative physician attitudes, particularly among general surgeons, about the ability of these nonphysician

healthcare providers to perform flexible sigmoidoscopy. Focus should also be given to the identification of resources to expand training opportunities in flexible sigmoidoscopy for nonphysician providers. More work is needed to assess the financial implications of and patient satisfaction with using nurse practitioners and physician assistants to provide screening endoscopy. Furthermore, the extent to which physicians may be using nurses or other office staff to offer FOBT to eligible patients requires examination. Finally, as efforts to increase rates of CRC screening in the United States intensify, there will be an ongoing need for data to monitor access to and delivery of this preventive service. These monitoring efforts should extend to nonphysician healthcare providers.

References

1. U.S. Preventive Services Task Force. Screening for colorectal cancer: a recommendation and rationale. *Ann Intern Med* 2002;137:129-31.
2. Breen N, Wagner DK, Brown ML, Davis WW, Ballard-Barbash R. Progress in cancer screening over a decade: results of cancer screening from the 1987, 1992, and 1998 national health interview surveys. *J Natl Cancer Inst* 2001;93:1704-13.
3. Ransohoff DF, Lang CA. Sigmoidoscopic screening in the 1990's. *JAMA* 1993;269:1278-81.
4. Rex DK, Lieberman DA. Feasibility of colonoscopy screening: discussion of issues and recommendations regarding implementation. *Gastrointest Endosc* 2001;54:662-7.
5. Brown ML, Klabunde CN, Mysliwiec P. Current capacity for endoscopic colorectal cancer screening in the United States: data from the National Cancer Institute Survey of Colorectal Cancer Screening Practices. *Am J Med* 2003;115:129-33.
6. Klabunde CN, Frame PS, Meadow A, Jones E, Nadel M, Vernon SW. A national survey of primary care physicians' colorectal cancer screening recommendations and practices. *Prev Med* 2003;36:352-62.
7. Palitz AM, Selby JV, Grossman S, et al. The Colon Cancer Prevention Program (CoCAP): rationale, implementation, and preliminary results. *HMO Pract* 1997;11:5-12.
8. Bresalier RS, Pinsky P, Weissfeld J, et al. Effectiveness of nurse endoscopists in the prostate, lung, colorectal, and ovarian (PLCO) cancer screening trial. 2002 AGA Abstract: A-479 (No. T1552).
9. Thompson NJ, Boyko EJ, Dominitz JA, et al. A randomized trial of a clinic-based support staff intervention to increase the rate of fecal occult blood test ordering. *Prev Med* 2000;30:244-51.
10. Maule WF. Screening for colorectal cancer by nurse endoscopists. *N Engl J Med* 1994;330:183-7.
11. Wallace MB, Kemp JA, Meyer F, et al. Screening for colorectal cancer with flexible sigmoidoscopy by nonphysician endoscopists. *Am J Med* 1999;107:214-8.
12. Schoenfeld PS, Cash B, Kita J, Piorkowski M, Cruess D, Ransohoff D. Effectiveness and patient satisfaction with screening flexible sigmoidoscopy performed by registered nurses. *Gastrointest Endosc* 1999;49:158-62.
13. O'Malley MS, Shaheen NJ, Crosby MA, et al. Colorectal cancer screening in North Carolina community clinicians' perspectives. *N C Med J* 2001;62:292-6.
14. Starfield B. Primary care: balancing health needs, services, and technology. New York: Oxford University Press, 1998.
15. Shaheen NJ, Crosby MA, O'Malley MS, et al. The practices and attitudes of primary care nurse practitioners and physician assistants with respect to colorectal cancer screening. *Am J Gastroenterol* 2000;95:3259-65.
16. Spencer RJ, Ready RL. Utilization of nurse endoscopists for sigmoidoscopic examinations. *Dis Colon Rectum* 1977;20:94-6.
17. Cash BD, Schoenfeld PS, Ransohoff DF. Licensure, use, and training of paramedical personnel to perform screening flexible sigmoidoscopy. *Gastrointest Endosc* 1999;49:163-9.

18. American Society For Gastrointestinal Endoscopy. Guidelines for training non-specialists in screening flexible sigmoidoscopy. *Gastrointest Endosc* 2000;51:783–5.
19. Lal SK, Schroy PC, Heeren T. A national survey of flexible sigmoidoscopy (FS) training in primary care education programs. 2002 AGA Abstract:A-40 (No. 354).
20. U.S. Department of Health and Human Services. *Health People 2010*. Washington DC: U.S. Government Printing Office, 2000.
21. Medicare Payment Advisory Commission. Report to the Congress: Medicare Payment to Advanced Practice Nurses and Physician Assistants. Washington DC: Medpac, June 2002.
22. American Academy of Physician Assistants. 2001 AAPA Physician Assistant Census Report. Available at: www.aapa.org/research/01census-intro.html. Accessed October 28, 2002.
23. Hooker RS, McCaig LF. Use of physician assistants and nurse practitioners in primary care, 1995–1999. *Health Aff* 2001;20:231–8.